CLAIMS:

1. An apparatus 440 in a digital video transmitter 110 for combining advanced data partitioning and fine granularity scalability in the transmission of digital video signals, said apparatus 440 comprising a partition unit 440 within a base layer encoding unit 410 of a video encoder 400 that partitions a base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320.

2. An apparatus 440 as claimed in Claim 1 further comprising a partition point calculation unit 430 having an output coupled to an input of said partition unit 440, wherein said partition point calculation unit 430 provides to said partition unit 440 partition point information for said base layer bit stream 310, 320 to divide said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320.

3. An apparatus 440 as claimed in Claim 1 wherein said plurality of base layer partition bit streams 310, 320 comprise base layer first partition bit stream 310 and base layer second partition bit stream 320.

4. An apparatus 440 as claimed in Claim 3 wherein said apparatus 440 further comprises a non-scalable coder unit 444 that encodes one of: said base layer first partition bit stream 310 and said base layer second partition bit stream 320.

5. An apparatus 440 as claimed in Claim 3 wherein said apparatus further comprises a scalable coder unit 442 that encodes one of: said base layer first partition bit stream 310 and said base layer second partition bit stream 320.

6. An apparatus 710, 720, 750 in a digital video transmitter 110 for combining advanced data partitioning and fine granularity scalability in the transmission of digital video signals, said apparatus 710, 720, 750 comprising:

FGS transcoder 710, wherein said FGS transcoder 710 is capable of transcoding a single layer bit stream into a base layer bit stream 310, 320 having a base layer bit rate R_B and an enhancement layer bit stream 300 having an enhancement layer bit rate R_E;

variable length decoder unit 720 coupled to said FGS transcoder 710, wherein said variable length decoder 720 is capable receiving said base layer bit stream 310, 320 from said FGS transcoder 710, and decoding variable length codes in said base layer bit stream 310, 320; and

variable length codes buffer 750 coupled to said variable length decoder unit 720, wherein said variable length codes buffer 750 is capable of receiving said variable length codes from said variable length decoder unit 720 and using said variable length codes to partition said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320.

7. An apparatus 710, 720, 750 as claimed in Claim 6 further comprising a partitioning point finder unit 740 having an output coupled to an input of said variable length codes buffer 750, wherein said partitioning point finder unit 740 is capable of calculating and providing to said variable length codes buffer 750 optimal partition point information for dividing a base layer bit stream 310, 320 into said plurality of base layer partition bit streams 310, 320.

8. An apparatus 710, 720, 740, 750 as claimed in Claim 7 wherein said partitioning point finder unit 740 is capable of determining an optimal bit rate for a base layer first partition bit stream 310 by comparing a temporal correlation coefficient (TCC) to a threshold value where said temporal correlation coefficient is calculated by the formula:

$$TCC = \frac{\left| \left(\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f \right) \left(r(w,h) - Ave_r \right) \right) \right|}{\sqrt{\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f \right)^2 \sum_{w=1}^{W} \sum_{h=1}^{H} \left(r(w,h) - Ave_r \right)^2}}$$

where W is the width of a frame/image and H is the height of the frame/image, and the letter "f" designates a current frame, and the term "Ave_f" is an average pixel value of the current frame, and the letter "r" designates a motion compensated reference frame for "f" and the term "Ave_r" is an average pixel value for the motion compensated reference frame.

9. A method for combining advanced data partitioning and fine granularity scalability in the transmission of digital video signals in a digital video transmitter 110, said method comprising the steps of:

partitioning a base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320; and

encoding with a coder unit at least one base layer partition bit stream of said plurality of base layer partition bit streams 310, 320.

10. A method as claimed in Claim 9 wherein said coder unit is one of: a scalable coder unit 442 and a non-scalable coder unit 444.

11. A method as claimed in Claim 9 further comprising the steps of:

calculating values that represent partition point information in said base layer bit stream 310, 320; and

dividing said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320 using said values.

12. A method as claimed in Claim 9 further comprising the steps of:

determining an optimal bit rate for a base layer first partition bit stream 310 by comparing a temporal correlation coefficient (TCC) to a threshold value where said temporal correlation coefficient is calculated by the formula:

$$TCC = \frac{\left| \left(\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f\right)\left(r(w,h) - Ave_r\right) \right) \right|}{\sqrt{\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f\right)^2 \sum_{w=1}^{W} \sum_{h=1}^{H} \left(r(w,h) - Ave_r\right)^2}}$$

where W is the width of a frame/image and H is the height of the frame/image, and the letter "f" designates a current frame, and the term "Ave_f" is an average pixel value of the current frame, and the letter "r" designates a motion compensated reference frame for "f" and the term "Ave_r" is an average pixel value for the motion compensated reference frame.

13. A method as claimed in Claim 9 further comprising the steps of:

partitioning a base layer bit stream 310, 320 into a base layer first partition bit stream 310 and into a base layer second partition bit stream 320;

determining a bit rate range from a minimum bit rate to a maximum bit rate;

determining an approximate amount of complexity that is tolerable by a video device;

determining a base layer second partition bit rate 320 for fine granularity scalability that corresponds to said approximate amount of complexity;

encoding a fine granularity scalability bit stream using said base layer second partition bit rate 320; and

encoding a base layer bit stream using advanced data partitioning.

14. A method as claimed in Claim 9 further comprising the steps of:

partitioning a base layer bit stream 310, 320 into a base layer first partition bit stream 310 and into a base layer second partition bit stream 320;

determining a bit rate range from a minimum bit rate R_{MIN} to a maximum bit rate R_{MAX};

determining a bit rate range to be covered each resolution in a video device;

determining a bit rate range from R_{MIN} to R_{MAX1} for a resolution X;

determining a bit rate range from R_{MAX1} to R_{MAX} for a resolution 4X;

encoding a fine granularity scalability bit stream at bit rate R_{MAX1} at resolution 4X; and

encoding a base layer bit stream using advanced data partitioning with a base layer first partition 310 having a bit rate of R_{MIN} at resolution X.

15. A method as claimed in Claim 9 further comprising the steps of:

transcoding a single layer bit stream with an FGS transcoder 710 into base layer bit stream 310, 320 having a base layer bit rate R_B and an enhancement layer bit stream 300 having an enhancement layer bit rate R_E;

sending said base layer bit stream 310, 320 from said FGS transcoder 710 to a variable length encoder 720;

decoding variable length codes in said base layer bit stream 310, 320 with said variable length decoder 720; and

sending said variable length codes from said variable length decoder unit 720 to a variable length codes buffer 750; and

using said variable length codes to partition said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320.

16. A method as claimed in Claim 15 further comprising the steps of:

calculating in a partitioning point finding unit 740 an optimal partition point for dividing said base layer bit stream 310, 320 into a base layer first partition bit stream 310 and a base layer second partition bit stream 320; and

providing said optimal partition point to said variable length codes buffer 750.

17. A digitally encoded video signal generated by a method for combining advanced data partitioning and fine granularity scalability in the transmission of digital video signals, said method comprising the steps of:

partitioning a base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320; and

encoding with a coder unit at least one base layer partition bit streams of said plurality of base layer partition bit streams 310, 320.

18. A digitally encoded video signal as claimed in Claim 17 wherein said coder unit is one of: a scalable coder unit 442 and a non-scalable coder unit 444.

19. A digitally encoded video signal as claimed in Claim 17 wherein said method further comprises the steps of:

calculating values that represent partition point information in said base layer bit stream 310, 320; and

dividing said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320 using said values.

20. A digitally encoded video signal as claimed in Claim 17 wherein said method further comprises the steps of:

determining an optimal bit rate for a base layer first partition bit stream 310 by comparing a temporal correlation coefficient (TCC) to a threshold value where said temporal correlation coefficient is calculated by the formula:

$$TCC = \frac{\left| \left(\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f\right)\left(r(w,h) - Ave_r\right) \right) \right|}{\sqrt{\sum_{w=1}^{W} \sum_{h=1}^{H} \left(f(w,h) - Ave_f\right)^2 \sum_{w=1}^{W} \sum_{h=1}^{H} \left(r(w,h) - Ave_r\right)^2}}$$

where W is the width of a frame/image and H is the height of the frame/image, and the letter "f" designates a current frame, and the term "Ave_f" is an average pixel value of the current frame, and the letter "r" designates a motion compensated reference frame for "f" and the term "Ave_r" is an average pixel value for the motion compensated reference frame.

21. A digitally encoded video signal as claimed in Claim 17 wherein said method further comprises the steps of:

partitioning a base layer bit stream 310, 320 into a base layer first partition bit stream 310 and into a base layer second partition bit stream 320;

determining a bit rate range from a minimum bit rate to a maximum bit rate;

determining an approximate amount of complexity that is tolerable by a video device;

determining a base layer second partition bit rate 320 for fine granularity scalability that corresponds to said approximate amount of complexity;

encoding a fine granularity scalability bit stream using said base layer second partition bit rate 320; and

encoding a base layer bit stream using advanced data partitioning.

22. A digitally encoded video signal as claimed in Claim 17 wherein said method further comprises the steps of:

partitioning a base layer bit stream 310, 320 into a base layer first partition bit stream 310 and into a base layer second partition bit stream 320;

determining a bit rate range from a minimum bit rate R_{MIN} to a maximum bit rate R_{MAX};

determining a bit rate range to be covered each resolution in a video device;

determining a bit rate range from R_{MIN} to R_{MAX1} for a resolution X;

determining a bit rate range from R_{MAX1} to R_{MAX} for a resolution 4X;

encoding a fine granularity scalability bit stream at bit rate R_{MAX1} at resolution 4X; and

encoding a base layer bit stream using advanced data partitioning with a base layer first partition 310 having a bit rate of R_{MIN} at resolution X.

23. A digitally encoded video signal as claimed in Claim 17 wherein said method further comprises the steps of:

transcoding a single layer bit stream with an FGS transcoder 710 into base layer bit stream 310, 320 having a base layer bit rate R_B and an enhancement layer bit stream 300 having an enhancement layer bit rate R_E;

sending said base layer bit stream 310, 320 from said FGS transcoder 710 to a variable length encoder 720;

decoding variable length codes in said base layer bit stream 310, 320 with said variable length decoder 720; and

sending said variable length codes from said variable length decoder unit 720 to a

variable length codes buffer 750; and

using said variable length codes to partition said base layer bit stream 310, 320 into a plurality of base layer partition bit streams 310, 320.

24. A digitally encoded video signal as claimed in Claim 23 wherein said method further comprises the steps of:

calculating in a partitioning point finding unit 740 an optimal partition point for dividing said base layer bit stream 310, 320 into a base layer first partition bit stream 310 and a base layer second partition bit stream 320; and

providing said optimal partition point to said variable length codes buffer 750.